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ABSTRACTS OF TUBERCULOSIS

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Diagnosis of Intrathoracic Lesions.—There are areas in the lungs relatively invisible to X-ray just as there are silent areas to auscultation. The idea that areas superimposed by the denser shadows of heart, mediastinum, diaphragms and even ribs are not amenable to X-ray study is largely responsible for oblique and stereoscopic projections. Bronchography, too, has made visualization more successful. The possibility of lesions in the lung being hidden by a central shadow must always be remembered. Many textbooks show the cardiac area as a blank, the inference being that structures behind it cannot be examined by X-ray, but experienced roentgenologists are frequently able to detect lesions of the lungs and pleura within the cardiac shadow by observing changes in the density of this shadow. The observation of such variations in density have been of great help to the author in the diagnosis of pleural and pulmonary lesions. Such observations are especially important when anterior-posterior films are all that are available, as is the case in acute and severe illnesses. Reasonable penetration must be used in order to bring out the variations in the central shadow. Such overexposure is not harmful and it may be of value in demonstrating obscure lesions. A study of the cross section of the chest shows that the diameter of the heart is approximately equal throughout its extent except in the most caudal portion. Hence the density of the normal cardiac shadow above the level of the diaphragms should be uniform on both sides of the spine. Over the spine the density necessarily is greater because of the superimposed shadows of sternum, vertebrae, great vessels and other mediastinal shadows. Observation of the relative density of the right and left sides of the cardiac shadow may be an important aid in the diagnosis of lobar pneumonia, especially of the left lower lobe. An increase in density on the right side may be used to differentiate lower lobe consolidations from those of the middle lobe. Other lesions such as localized bronchiectasis, atelectasis, lung abscess, tumor, mediastinal pleural effusion may also be manifest in this way. Cases illustrating findings in some of these abnormalities are presented.—*The Density of the Central Shadow in the Diagnosis of Intrathoracic Lesions, L. G. Rigler, Radiology, March, 1939, xxxii, 316.*—(*G. F. M.*)

Serial Roentgenography in Pulmonary Disease.—Roentgenography is the most important single factor in the diagnosis of pulmonary disease but it must be used with discretion, proper technique and skilful interpretation. Provisions made for X-ray examination of hospital and dispensary patients are improving but still frequently inadequate. Without sufficient X-ray facilities, modern methods of therapy, especially in pulmonary tuberculosis, can only be haphazardly carried out. A single position may not be sufficient, even if the technique is good, and repetition after an interval may be needed to substantiate tentative diagnoses. Stereoscopic films are preferred by

some to localize cavities and adhesions, others prefer films taken in different positions; here fluoroscopy is a definite aid. Tomography may also help. Artificial pneumothorax treatment, in particular, requires both frequent roentgenography and fluoroscopy. Serial roentgenography is of value in assessing the progress of the disease and the value of special treatments. It is of value in early detection of extensions of the disease. In hospitals films should be taken at least every three months.—*Serial Skiagraphy in Pulmonary Disease, G. Jessel, Tubercle, November, 1938, xx, 72.*—(*A. P.*)

Detection of Tuberculosis.—As there may exist some doubt as to the value of the different examinations for the presence of tuberculous infection a study comparing pathological examination, tuberculin test and X-ray examination is presented. A short review of the histological facts shows that the pathological examination is a highly accurate method of detecting the presence of the primary tuberculosis complex. Concerning the tuberculin test the importance of certain factors, such as correct technique and interpretation and properly standardized and potent tuberculin, is emphasized and partly described in detail. The evidence of specificity of a good tuberculin is demonstrated by a summary of the voluminous literature. The description of the X-ray examination refers particularly to certain physical limitations of this method, such as invisibility of extrapulmonary foci and pulmonary foci too small for visualization, the impossibility to see small noncalcified foci and calcified lesions of nontuberculous aetiology. Several authors have recently reported observations on children who were non-reactors to tuberculin in spite of definite roentgenological evidence of calcified lesions. In adults there appears to be a lower percentage with shadows interpreted as calcium deposits than in children. This smaller percentage may be due in part to resorption of calcium and bone as described by Sweany. In Lymanhurst School in Minneapolis, 16,824 children have been examined since 1921, many of whom have been reëxamined periodically from infancy through the period of childhood to adulthood. Thus, complete evolution of tuberculosis in the human body and various forms of acute and chronic reinfections have been observed. In 1925 the roentgenologists found calcium deposits in 72.6 per cent out of 1,412 children, 55 per cent of whom did not react to tuberculin. Similar figures were found in later years. Detailed reports of the years 1931 and 1938 are given. As conclusion the "studies have led us to look on the X-ray film of the chest of children as almost a total waste as far as tuberculosis is concerned." However, in adolescent and adult life every tuberculin reactor should have an X-ray examination of the chest annually and much more frequently if shadows appear which may indicate clinical tuberculosis. The latter should be subjected to complete examination.—*The Detection of Tuberculous Infection, J. A. Myers, J. A. M. A., May 13, 1939, cxii, 1904.*—(*A. B. T.*)

Planigraphy.—Because of the newer concepts in the treatment of pulmonary tuberculosis it behooves the roentgenologist to accurately diagnose and locate anatomical and pathological entities in the chest. A comparatively new aid by which this challenge can be met is in the application of planigraphy. First demonstrated by Bocage and clinically applied in this country by Keiffer and Moore, it offers definite help, especially in the diagnosis of thoracic lesions. While routine films and those made with the Bucky diaphragm often appear satisfactory, a more accurate localization and better anatomical definition of the actual condition may often be obtained by planigraphy. This is especially true in the localization of an opaque foreign body. However, in pulmonary tuberculosis it is also of value in demonstrating chest lesions not satisfactorily seen by routine X-ray films and in showing the true extent of lesions. Thus, it is an aid in determining the procedure to be used and permits a more satisfactory estimate of the effectiveness of the treatment. Planigraphy is also of value in demonstrating the extent and character of bronchiectasis, the location and growth of intrathoracic tumors, the effect of radiation on metastatic malignancies, the nature of thoracic lesions otherwise obscured by pulmonitis and the size and relation to other organs of bone tumors.—*Planigraphy. Its Application to Thoracic Diagnosis, W. E. Howes, Radiology, May, 1939, xxxii, 556.*—(*G. F. M.*)

Miniature X-ray Films.—For the purpose of case-finding in large groups, Holfelder devised a method of X-ray photography, in which 24 mm. films are made from fluoroscopic images. With a staff of technicians trained in this method, it was possible to take as many as 400 exposures per hour. Sufficient definition is obtained in these films to demonstrate suspicious cardiac and pulmonary disease but final confirmation by the usual means is suggested. As a result of this method an incidence of .87 per cent active pulmonary tuberculosis was found among 10,000 men who had previously been found negative on fluoroscopy. While this

method offers an economical and rapid method of examining roentgenologically large groups, it is not intended to supplant the usual roentgen technique.—(Der erste Grosseinsatz des Röntgenreihenbildners im S.S.-Lager zu Nürnberg, H. Holfelder, München. med. Wchnschr., September 23, 1938, lxxxv, 1465).—*Stand und Aussichten der Kleinbildfotografie vom Röngenschirm, H. Holfelder & F. Berner, München. med. Wchnschr., November 25, 1938, lxxxv, 1818.*—(*A. B. C.*)

Polyarcuate Diaphragm.—In 1922 Thomas advanced the idea that this condition, often seen in chest films, is not connected with any pathology of the lungs or of the diaphragm itself. Thomas believes that multiple arching of the diaphragm is due to contraction of the longer and stronger muscle bundles. In 1935 Becchini, on the other hand, stated that this multiple arching is the result of an alteration of the normal tone of one or more sectors of the diaphragm, and precisely an increase of tone for the largest number or for the greatest intensity of stimuli that reach the diaphragm, either because of changes in some small branch of the phrenic nerve, probably entangled in pleural exudates, or because these stimuli arise from altered muscular fibres. Becchini believes this irregularity of the diaphragm to be always pathological, because he had observed it in 40 per cent of patients with pulmonary conditions, while he hardly ever had observed it in healthy individuals. Torelli by the radiographic studies of 1,370 healthy subjects and of 993 sanatorium patients definitely concluded that this irregularity of the diaphragm is seen in practically equal numbers of both groups, in fact, slightly more often in his healthy subjects. In this series Torelli saw it in 53 per cent of the healthy males and in 50 per cent of the sick, in 39 per cent of the healthy females and in 38 per cent of the sick, and in 10 per cent of healthy children. In 90 per cent of all cases multiple arching was noted on the right. On the basis of this study, therefore, Torelli is prone to accept the theory of Thomas, and believes that the appearance of polyarcuate diaphragm has no pathological significance and is but a morphological variation due to a different contraction of the muscle bundles of the diaphragm.—*Sul significato del diaframma poliarcuato, G. Torelli, Annali dell'Istituto Carlo Forlanini, April, 1939, iii, 285.*—(*S. L.*)

Lateral Roentgenograms.—The interpretation of the roentgenogram is sufficiently uncertain in many cases that a control by another roentgenogram taken in a different angle is necessary. The author has stressed the advantages of this procedure and has outlined the special positions necessary to explore for example the mediastinal blind alley. A lateral film should never be taken alone in preference to the ordinary standard roentgenogram; its use should be only to complete and control the interpretation of certain details. It must be remembered that if the lateral film has advantages it also has faults and limitations. The first advantage of the lateral (transverse) X-ray film is that it reveals lesions which are more or less hidden on the ordinary films. While tomographic exploration is extremely valuable in this regard, its use is difficult and expensive. The lateral X-ray film reveals certain dense lesions hidden by an adjacent opacity, such as the shadow of the heart or liver. The hilar regions too can be visualized this way and finally vascular shadows may enlarge in the presence of lesions and mask these lesions. Two instances of this latter type were seen. In both, the standard film as well as physical examination were negative. Sputum was positive for tubercle bacilli. Lateral films showed a small area of increased density in the hilar region and serial roentgenograms showed the gradual development of cavities in that area. The X-ray film dissociated the shadows which were posteriorly located, and specified the images of the hilum which were normal from the dense lesion that was excavating. In other circumstances the lateral X-ray film shows lesions camouflaged by pulmonary transparency. Examples of this are certain apical round cavities with delicate border and contours, parts of which blend with the image of the first rib. Also certain pulmonary cysts may pass unnoticed on the ordinary film but appear on a lateral film. Invisible pneumothorax or partial pneumothorax often not visualized on a standard film are seen on lateral films. In some cases invisible pleurisies, pleurisies with effusion exceeding 500 cc. are not seen in anteroposterior views because of the pulmonary brightness, but transverse films show these. Certain fissures with marked thickening or certain effusions of the inferior fissure pass easily unseen in face view and are only seen in profile view.—*Ce que révèlent les radiographies de proiff, P. Pruvost, Arch. méd. chir. de l'app. respir., 1938, xiii, 223.*—(*J. E. F.*)

Roentgenogram of Apex.—In 1937 Twining described a method for examination of the pulmonary apex which projected one apex clear of the other. This method has been used at Sea View Hospital. The examination is made either in the erect or in

the recumbent position. The axilla of the side to be considered is placed next to the film and the arm on the same side is placed in extreme abduction against the head. The body is in a true lateral position with the opposite shoulder depressed. The tube is tilted about fifteen degrees and placed so that the central ray enters the uppermost supraclavicular fossa and emerges through the axilla of the side adjacent to the film. The tube is at a distance of forty-two inches. This position provides excellent visualization of the bony structures of the upper thorax. It is also of value in demonstrating apical adhesions in a pneumothorax.—*A Lateral View of the Pulmonary Apex and Upper Dorsal Spine, M. F. Mark & H. K. Taylor, Quart. Bull. Sea View Hosp., January, 1939, iv, 189.*—(*A. A. E.*)

Roentgenkymography of Hilum.—Studies had been made of the function of the hilum in normal individuals and in patients with diseases of the heart, but none in patients with pulmonary tuberculosis. For the present study the apparatus of Stumpf was used, with the grid having horizontal slits. Roentgenkymograms were taken of 10 patients having demonstrable parenchymatous lesions according to previously taken roentgenograms, and of 15 individuals having normal chest films, to serve as controls. Hypomotility of the hilar structures was constantly observed in the tuberculous. This hypomotility was noted in various degrees; occasionally there would be noted even complete immobility of the hilum. Some degree of hypomotility was noted also in the roentgenkymograms of the hila of patients previously showing either a marked increase of the hilar shadows, or very mild or apparently healed pulmonary lesions; but this hypomotility was not found to be constant and it was always less marked. This concluded that pulmonary tuberculosis always causes a disturbance of the function of the hilar structures. When hypomotility of the hilum is noted in roentgenkymograms of patients having roentgenograms apparently free from any parenchymatous or hilar lesions, but at the same time presenting clinical manifestations of disease, the roentgenkymographic findings may constitute an added element to the specific diagnosis, and further investigation of the suspected cases is warranted.—*Studi röntgen-chimografici sugli ili polmonari nella tubercolosi dell'apparecchio respiratorio, M. Mattina, Riv. di pat. e clin. d. tuberc., December, 1938, xii, 886.*—(*S. L.*)

Roentgenkymography of Diaphragm in Nasal Stenosis.—Stating that physiological respiration is through the nares, as proved by the newborn whose death is certain when complete occlusion of the nasal passages occurs, and stating that oral breathing is learned by the individual as he grows, but that such respiration supplies only two-thirds of the amount of air as that supplied by the nasal route, the authors remind us, too, that air passing through the nose is warmed to near-body temperature, is humidified and filtered. Lenoir and Camus noted the efficacy of this filtering process in relation to the tubercle bacillus, and Lermoyez attributed this to the bactericidal power of the secretion of the nasal mucosa. Numerous researches, both clinical and experimental, establish that nasal stenosis brings important pulmonary and thoracic changes: pulmonary emphysema has been produced experimentally in animals, and has been observed at autopsy of men who had a history of nasal stenosis; also, flattening of the upper thorax, increase in the transverse diameter and asymmetries of the thorax have been noted in patients with such stenosis. On the basis of these facts the authors have investigated changes in the roentgenkymogram of the diaphragm in individuals with nasal stenosis, special attention having been given to unilateral stenosis in relation to the function of the homolateral diaphragm. The apparatus used for this investigation was the analytic roentgenkymograph devised by Cignolini, which consists of a grid with as many windows as the number of regions to be studied; the resulting graph is registered for the whole distance of the film. A timer, graduated to .2 second, is attached to this apparatus, so as to determine the duration and rhythm of the two respiratory phases. In normal individuals they found that passage from expiration to inspiration is gradual on quiet breathing, but is sharp on rapid breathing. On quiet breathing the expiratory phase lasts on an average of three times as long as the inspiratory phase, is equal for both diaphragms, and the diaphragmatic excursion is about 10 mm.; on fast breathing, the right expiratory phase is about one-third as much longer, and the left expiratory phase is twice as long, as the homolateral inspiration, and the diaphragmatic excursion is about 13 mm. on the average. Excursions are somewhat more limited in women. In patients with nasal stenosis, whether of long standing or recent, the passage from expiration to inspiration is always sudden, either on quiet or on fast breathing. In old stenosis the excursions of the diaphragm are much slower and shorter, that of expiration being three to six times longer than that of the inspiration; in recent stenosis the rhythm

is faster and longer, and the time taken by inspiration is as long as, if not longer than, that by expiration. The only difference noted in roentgenkymographic studies of patients with unilateral stenosis was that these changes in the function of the diaphragm were more marked on the same side as the nasal stenosis. The authors conclude that (*a*) in nasal stenosis there is a modification of the normal morphology of the diaphragmatic respiratory wave, characterized by a sudden centripetal inspiratory motion, at strongly acute angle; (*b*) there is also a difference in all other factors according to the duration of stenosis; (*c*) in unilateral nasal stenosis there is accentuation of diaphragmatic anomalies on the same side as that of the stenosis.—*Roentgenchimografia del diaframma nella stenosis delle prime vie respiratorie (metodo Cignolini), L. Ciurlo & A. Oliveri, Accademia med., July, 1938, liii, 189.*—(*S. L.*)

Bronchograms.—A simple and effective method for intratracheal instillation of opaque oil by way of a small catheter passed through the nares and down the trachea is described. The tip of the catheter is directed into the larynx by a loop or hook. Fluoroscopic examination is readily carried out during the time of instillation.—*Instillation of Opaque Oil into the Bronchus, H. B. Hunt & J. D. Bisgard, J. Thoracic Surg., February, 1939, viii, 334.*—(*L. F. B.*)

Bronchoscopy.—The prognosis for a wide variety of pulmonary disorders has improved tremendously during the past decade, because of improved diagnostic and therapeutic methods. Of importance in the attainment of these results is the realization that effective group teamwork by individuals thoroughly trained in their particular specialty contributes immensely to the better therapeutic results of to-day. The development of thoracic surgery during the past five or ten years has depended not only on improved surgical technique, anaesthesia and postoperative as well as preoperative care, but also on better X-ray and pathological studies. Probably the greatest single step forward has been early and actual diagnosis by direct inspection of the lesion. The usual methods of study, namely physical and X-ray, unfortunately do not reveal in many cases the exact nature of the disease, nor do they demonstrate its endobronchial distribution. These usually may be established by direct endobronchial inspection and by the study of biopsy specimens. The same approach is extremely valuable in the treatment of certain varieties of pulmonary disorder, prominent among which are lung abscess and localized tuberculous lesions. The percentage of cures obtained by bronchoscopic treatment in cases of lung abscess demonstrates the necessity for keeping in mind this method when outlining treatment in such cases. It is the accepted method for removal of a foreign body and is the only approach for applying direct treatment to localized tuberculous lesions. In establishing the cause and location of unexplained pulmonary bleeding, bronchoscopic inspection is most helpful. The authors have had no unfavorable reaction as a result of the necessary manipulations, and feel that the propitious time for such examination is while bleeding is active. In the taking of biopsy specimens one may miss the diagnosis of carcinoma, for example, by not cutting deeply enough through surrounding fibrous tissue to include the cancer cells in the specimen. Every patient with bronchiectasis should have at least one bronchoscopic examination because of the possible presence of an unsuspected foreign body or bronchial stenosis caused by scar tissue or granulation tissue. A fairly good percentage of patients with lung abscess will make complete recovery by bronchoscopic treatment combined with medical care, which consists chiefly of rest in bed and postural drainage. Bronchoscopic treatment consists in the removal of granulation tissue if present from around the fistula leading into the abscess, dilation of the fistula, the use of special suction tubes and the introduction of remedies which help to reduce the virulence of the infection. These consist of 1 per cent guaiacol in oil of sweet almond and iodized poppyseed oil. The chronic unilocular abscess with exuberant granulation tissue which bleeds when suction or sponging is done and which has a very foul odor offers a good prognosis for recovery with bronchoscopic treatment alone. At all times the bronchoscopist must be prepared to deal with haemorrhage.—*The Bronchoscopist and the Thoracic Surgery Team, M. F. Arbuckle & A. C. Stutsman, J. A. M. A., October 7, 1939, cxiii, 1394.*—(*G. L. L.*)

Diagnosis of Cavity.—In bilateral pulmonary tuberculosis an accurate diagnosis of the pulmonary lesions is extremely important, particularly when collapse therapy is to be utilized. While noncavitating tuberculosis does not require collapse, the cavitating caseous pneumonic disease progresses rapidly unless controlled by this therapy and, furthermore, in bilateral disease the complete control of one side is useless if there be an uncontrolled caseous lesion on the other. Because of the importance of ascertaining the presence or absence of a cavity a diagnostic pneumothorax has been

used. When air is introduced into the pleural space and the lung falls away from the chest wall any pulmonary lesion, especially a cavity, appears larger and clearer. An initial pneumothorax and one refill of 200 to 300 cc. are given. The chest is then X-rayed. If a cavity is seen the pneumothorax is continued as a regular pneumothorax treatment. If, however, no cavity can be visualized, no further refills are given and the lung is allowed to reëxpand completely before thoracoplasty is undertaken on the opposite side. In a series of cases treated at Sea View Hospital this diagnostic procedure was necessary 68 times. Of this number, 20 were found to have caseous pneumonic lesions and the pneumothorax was continued. In 37 patients no cavity was seen and the pneumothorax was abandoned. In 11 patients the lung was completely adherent and no air could be instilled. In 6 individuals in whom the diagnostic pneumothorax failed to disclose a cavity and was therefore abandoned, there subsequently developed a cavity in the same lung and the pneumothorax was successfully reëstablished. It is felt that this method for ascertaining the presence of a cavity in the relatively less involved lung is of great value before attempting thoracoplasty for control of a lesion on the opposite side.—*Diagnosis of Cavity by the Institution of Artificial Pneumothorax, E. R. Levine & L. Galison, Quart. Bull. Sea View Hosp., April, 1939, iv, 301.*—(*A. A. E.*)

Radiophotography.—The method introduced by de Abreu of Brazil in 1937 has been applied to mass roentgenography of soldiers in the French army. The method involves the use of a camera to record the image obtained upon a fluoroscopic screen. Fine grained panchromatic film is employed. With trained personnel, examination of 430 individuals can be easily completed in a day. The small films can be inspected directly, but preferably are interpreted by means of a magnifying apparatus or by projection on a screen. Although the cost is but a fraction of that with conventional large films, the authors are convinced that there is little loss of accuracy in the detection of tuberculous infiltrations.—*La radio-photographie, Fournié & Frezouls, Rev. de la tuberc., July, 1939, v, 795.*—(*H. L. I.*)

Micronodular Foci.—As seen in the roentgenogram, differential diagnosis of these conditions is often very difficult. Miliary tuberculosis, pneumonoconiosis, metastatic carcinomatous pulmonary lymphangitis, venous stasis in cardiac lesions and several forms of diffuse bronchopneumonias may all have analogous radiological appearances. In miliary tuberculosis the nodules are very small, sharply demarcated, usually surrounded by pulmonary tissue in healthy state, and prevail in the upper part of the lung fields; clinically there is associated a sudden, highly toxic onset, marked asthenia, dry cough and rapid progression. Tubercle bacilli may be found in the sputum. This condition is more often found in children. A chronic form of miliary tuberculosis in children shows the same fine nodular distribution, that may persist after eventual healing; clinically it has an insidious onset, few and vague symptoms, pallor and gradual wasting, anorexia, fatigue and dry cough. Fever is low, occasionally absent. It may heal or it may suddenly relapse, ending in meningitis. Pneumonoconiosis, and especially silicosis in the primary stage, will show miliary dissemination in the middle thirds of both lung fields, heavier hilar shadows and evidence of emphysema; clinically there may be nothing of note besides the rough breath sounds and a few sibilant râles. Anamnesis is of importance; no tubercle bacilli are found in the sputum. Carcinomatous lymphangitis shows throughout the pulmonary fields very thin linear densities, intertwining so as to give a reticular appearance, more marked at the hila, with numerous miliary nodules amongst these nets; clinically there is noted progressive asthenia, dry cough and dyspnoea. This disease is usually secondary to gastric carcinoma. Venous stasis of cardiac origin shows nodular dissemination in the lower pulmonary fields, especially on the right, marked increase of hilar shadows and a heart shadow consistent with the valvular lesion; clinically the cardiac lesion, usually of the mitral valve, and its syndrome are apparent.—*Considerazioni clinico-radiologiche sulle formazioni micro-nodulari diffuse del polmone, V. Fanano, Riv. di pat. e clin. d. tuberc., February, 1939, xii, 107.*—(*S. L.*)

Pleuropulmonary Fistula.—The detection of all types of pleuropulmonary fistulae in the presence of a pneumothorax may be done by pneumothorax air analysis. The necessary equipment includes: an apparatus for the accurate quantitative analysis of carbon dioxide and oxygen; two gas sampling tubes, each of at least 25 cc. capacity; an air-tight three-way stopcock; and a pneumothorax apparatus. Absolute air-tightness of all connections is essential. The dead space in the rubber tubing and connections should be less than 10 cc. The method to be used is first to collect a 25 cc. specimen of the pneumothorax air. The pressure within the pleural cavity is noted. Then, using the

second gas sampling tube, successive 25 cc. specimens are removed and discarded until an intrapleural pressure of −20 to −24 cc. of water on inspiration has been obtained. A second air specimen is now collected for analysis. Finally air is administered in the usual manner to restore the original pneumothorax pressure. The two collected specimens are then accurately analyzed for carbon dioxide and oxygen. In the absence of an open pleuropulmonary fistula the two pneumothorax air specimens show practically the same percentage volume of carbon dioxide and oxygen. If the fistula has been opened by the induced negative pressure, the second specimen will show more oxygen and less carbon dioxide than the first. With a wide open fistula both specimens will contain oxygen and carbon dioxide in percentages which are characteristic of an open fistula although there may be no significant difference between the two specimens. An open pleuropulmonary fistula is present: if the carbon dioxide content of the pneumothorax air is less than 5 per cent and the oxygen more than 7 per cent; if the carbon dioxide content is more than 10 per cent and the oxygen more than 1 per cent. These assumptions are based upon the results of analyses of 2,000 different specimens of pneumothorax air. Diagnosis of a bronchial fistula by gas analysis depends upon the determination of changes in pneumothorax air due to passage of air from the lungs into the pneumothorax space. By creating an adequate amount of negative pressure in the pneumothorax this passage of air is greatly facilitated. The resulting changes in the pneumothorax air composition may be readily found by gas analysis of samples of air taken from within the pleural space.—*The Diagnosis of Pleuro-Pulmonary Fistula by Pneumothorax Air Analysis, D. Matsuzawa, Quart. Bull. Sea View Hosp., April, 1939, iv, 286.*—(*A. A. E.*)

Bronchopleural Fistula.—The most serious complication that may arise in the course of treatment of pulmonary tuberculosis with artificial pneumothorax is bronchopleural fistula. There are two types of bronchopleural fistula and the first of these is readily recognized because of the dramatic symptoms and signs. The second type, the "silent" fistula, is not accompanied by sudden dyspnoea, pain, increase in the degree of collapse of the lung, and evidence of increased intrapleural pressure. It is, therefore, frequently difficult to recognize a bronchopleural fistula by means other than analysis of the pneumothorax air. Because of this fact it was decided to determine what the normal gas analysis of the air in a pneumothorax space is, and this was done by making routine and serial gas analyses in 7 individuals. These individuals were observed from the onset of the pneumothorax through all the complications and operative procedures which occurred, by analysis of a sample of pneumothorax air taken at the time of each refill. For a pneumothorax without effusion the normal oxygen content is 3.8 volume per cent. Because of the limited number of individuals observed the high normal, as demonstrated by other investigators, has been accepted as 5.25 volume per cent. Any oxygen percentage higher than this is indicative of a pleuropulmonary communication. The normal carbon dioxide level for uncomplicated pneumothorax is between 6 and 9 volume per cent. When fluid complicates a pneumothorax, the oxygen content ranges between 0 and 0.40 volume per cent. At the same time the carbon dioxide content is between 10 and 13 volume per cent. In the presence of a bronchopleural fistula the oxygen content may rise to as high as 16 to 20 volume per cent, although so high a reading usually means the presence of mixed pyogenic and tuberculous empyema. With an oxygen reading between 0.8 and 1.55 volume per cent, a small and perhaps intermittently open bronchopleural fistula is usually present.—*The Diagnosis of "Silent" Bronchopleural Fistula by Pleural Gas Analysis, P. N. Coryllos & A. Welkind, Quart. Bull. Sea View Hosp., July, 1939, iv, 377.*—(*A. A. E.*)

Diagnosis of Bronchopleural Fistula.—Common tests for the detection of bronchopleural fistula, including determination of intrapleural pressures, instillation of methylene blue and analysis of pleural air, are all frequently negative in the presence of fistulae. The authors believed a test substance in vapor form might be more accurate. Oil of peppermint was found a satisfactory material. Aspiration of 100 cc. of air from the chest was followed by the introduction of equal amounts which had been passed through 4 cotton tampons saturated with oil of peppermint. This procedure was repeated 10 to 30 times. When a bronchopleural fistula was present, the patient recognized the characteristic odor of peppermint. The test was applied to over a thousand patients. Pleuropulmonary communication was suspected on clinical grounds in 9 patients. The peppermint test was positive in 6 instances; in 5 of these the methylene blue test was negative. The test was also given to 70 patients at the time of induction of pneumothorax. A positive reaction was obtained in 15 patients, all

of whom were found to have adherent pleura. Clinical findings and intrapleural pressure readings demonstrated the traumatic fistula in only 3 of these patients.—*Diagnostic des perforations pulmonaires par l'épreuve de la menthe, C. Auguste & R. Pluchard, Rev. de la tuberc., November, 1938, iv, 1010.*—(*H. L. I.*)

Diagnostic Pneumothorax.—The value of pneumothorax as a diagnostic measure has not been emphasized sufficiently. The use of air as a contrast medium is well established in radiology. It is of value in many chest conditions. Tumors of the parietal pleura are well outlined by pneumothorax, following aspiration, by X-ray films taken in various positions. Adhesions are well visualized and these may include those rendering a pneumothorax unsatisfactory or showing when operations for lung abscess may be undertaken safely. A differentiation can be made between intrapulmonary shadows and extrapulmonary shadows, and between pleural, pericardial and mediastinal fluids. A tuberculous cavity may be more clearly demonstrated and the difference between atelectasis and interlobar empyema may be shown. Cases are presented illustrative of the value of this procedure.—*Diagnostic Pneumothorax, S. Schnur, Radiology, Feburary, 1939, xxxii, 198.*—(*G. F. M.*)

Diagnostic Aspiration of Lymph Nodes.—It is possible to ascertain the pathological-anatomical process of some disease with smears of aspirated lymph node fluid, stained like blood films. The method is simple; the microscopical evaluation, however, should be reserved to a specialist. Under certain circumstances such aspiration seems to be more convenient than a biopsy. It is easily carried out and may be done in several sites simultaneously. It is of less value in focal diseases. The characteristic smears of glandular hyperplasia in its acute and chronic form are described as well as those of pus formation and granulomatous diseases. Among the latter the smears in a case of Boeck's sarcoid are very typical with large clusters of epithelioid cells and a remarkably small number of lymphocytes. For practical purposes the diagnostic aspiration in Hodgkin's disease seems most important. One finds the typical Sternberg cells and cellular polymorphism. Definite changes can be demonstrated by repeated aspirations in the course of X-ray therapy. In patients with a tendency to reticular reactions an increase of reticulocytes can be found even with no visible changes in the lymph nodes. This has been true in children with Gaucher's disease. In malignancies the diagnostic value of lymph node aspiration seems to be uncertain. Aspiration, however, does not give rise to metastasis.—*Die diagnostische Bedeutung der Lymphdrüsenpunktion, R. Stahel, Schweiz. med. Wchnschr., April 15, 1939, xv, 333.*—(*A. B. T.*)

Treatment of Pulmonary Tuberculosis.—The author points out that the application of the principle of rest remains still as essential as ever and that it is on this principle that the whole of modern treatment rests. After discussing the various surgical procedures now in use, he suggests that treatment would be more satisfactory if the patient were continuously under the care of a single authority rather than being allowed to drift from one doctor to another or from one institution to another.—*Principles Underlying Treatment of Pulmonary Tuberculosis; C. P. Thomas, J. Roy. Inst. Pub. Health & Hyg., July, 1939, ii, 451.*—(*L. F. B.*)

Calcium Creosotate.—Previous experimental work has shown that calcium creosotate and creosote are closely comparable. Creosote and its preparations have been used extensively in the treatment of pulmonary tuberculosis despite the fact that a satisfactory explanation of their action has not been advanced. This study was undertaken to determine whether any modification of the twenty-four-hour sputum specimen could be demonstrated during administration of calcium creosotate. In order to determine the presence or absence of the drug in contact with the bronchial mucosa, the phenol content of twenty-four-hour specimens was investigated as well as the average daily volume. In the first group observed, an average of 30 determinations of sputum volume were made over a three-month period. Calcium creosotate was administered for a period of one month, the initial dose being 0.26 g. three times a day. This dose was increased if the patient was not nauseated, but it was impossible to give more than two tablets three times a day. In practically all cases it was necessary to discontinue the drug after a period of one month. The sputum volume remained quite constant from day to day and the sputum phenols did not increase during the period the drug was given. Observations made in a second series extended over three months, about 50 determinations being made for each average sputum volume. Half of this group was then given approximately four 0.26 g. calcium creosotate tablets daily for five consecutive months.

No significant variations were noted in those who received the drug as compared with the controls. Terpine hydrate given three times a day for seven days likewise showed no noteworthy change. Because of the preceding results, the expired air of animals receiving the drug was examined. These experiments showed no evidence of the presence of phenolic material in the expired air. The conclusion is reached from this investigation that there is no evidence of lessened cough, greater ease of expectoration or increase in appetite in those receiving calcium creosotate and that none of the creosotate was excreted in the sputum. Some patients were severely nauseated after short intervals of receiving the 0.75 g. of the drug daily.—*Studies on Calcium Creosotate. Observations on Its Use in Pulmonary Tuberculosis, E. J. Fellows, Am. J. M. Sc., May, 1939, cxcvii, 683.*—(*G. F. M.*)

Insulin in Bone and Joint Tuberculosis.—The successful management of bone and joint tuberculosis is contingent upon the improvement in nutrition and the general health of the patient. Insulin therapy was used on children, who, in spite of ideal conditions and either quiescent or healing lesions, were listless, without appetite and failed to gain weight. Of the 15 children, ranging from three to thirteen years in age, 14 had tuberculosis and one was a case of Legg-Perthes disease. Two to 5 units of insulin were injected hypodermically about twenty minutes before each meal to each patient. All the patients manifested either hunger or more interest in food. Twelve patients gained from 1 to 3 pounds in weight. In 3 patients there was no consistent weight gain until after the injections were discontinued. The authors feel that insulin is not indicated as a routine procedure in the treatment of bone and joint tuberculosis but should be tried in patients who do not gain or are losing weight.—*The Use of Insulin as an Adjunct in the Treatment of Bone and Joint Tuberculosis, R. L. Nichols & E. L. Compere, J. Bone & Joint Surg., October, 1939, xxi, 885.*—(*M. A. B.*)

Sex Hormones.—Castration increased slightly the duration of life of guinea pigs inoculated with tubercle bacilli. This effect was more marked in males. Injection of male and gonadotropic hormones prolonged the life of males, while injection of folliculin and gonadotropic hormone accelerated experimental tuberculosis in females. Clinical studies on tuberculous patients with disorders of menstruation confirmed the effectiveness of folliculin in relieving dysmenorrhoea. Corpus luteum preparations appeared to be beneficial in haemorrhagia. Gonadotropic hormones were without effect on menstrual disorders and were possibly responsible for an unfavorable action on the pulmonary disease. The effect of testosterone on the menstrual disturbances was equivocal; but a striking improvement in the general condition of tuberculous women followed use of this hormone.—*Étude expérimentale et thérapeutique de l'action des hormones génitales sur les accidents menstruels des tuberculeuses (3e mémoire), Pierre-Bourgeois, M. Boquet-Sesensky & D. Pierre-Bourgeois, Rev. de la tuberc., July, 1939, v, 754.*—(*H. L. I.*)

Sulfapyridine in Pulmonary Tuberculosis.—Because of a report in the literature on the effects of sulfapyridine on experimental tuberculosis in the guinea pig, the authors decided to investigate the possible effect of the drug on active cases of pulmonary tuberculosis, and over a period of time administered it to 7 patients with active and open pulmonary tuberculosis. The largest amount of the drug given to any one patient was 108 g., the smallest 5 g. Nausea and vomiting were the two most common toxic manifestations in the series, the former occurring in 5 of the 7 cases, the latter in 3. In 3 cases it was necessary to withdraw the drug permanently because of these symptoms. In one case it was necessary to withdraw the drug because of haematuria and ureteral obstruction. Two patients in this series have died of their disease. In these 7 cases no evidence was obtained to indicate that sulfapyridine influenced the course of the tuberculosis in any way.—*The Treatment of Pulmonary Tuberculosis with Sulfapyridine, S. T. Allison & R. Myers, J. A. M. A., October 28, 1939, cxiii, 1631.*—(*G. L. L.*)

Results of Cadmium Therapy in Pulmonary Tuberculosis.—Many heavy metals have been tried in treating pulmonary tuberculosis, without marked success except in the case of gold salts. Heaf, in 1937, following up Lund's earlier work in 1927, found that cadmium sulphide, in experiments on guinea pigs and rabbits, was nontoxic, painless and appeared both to stimulate fibrosis and inhibit tubercle formation. He thereupon treated 27 patients with a 1 per cent emulsion of this salt in olive oil, reporting 17 improved clinically, 11 roentgenographically, and 13 persistently sputum-negative. He considered the results comparable to those with gold salts and the cost was much less. Most of his cases appeared to be moderately advanced and with a fair prognosis. Cornwall here reports

his observations with the method on 40 patients at Fazakerley Sanatorium, Liverpool, of whom 36 had a bad prognosis. All cases but one were sputum-positive. In all, the patients had been confined to bed for varying periods without improvement and other forms of active treatment were contraindicated. In this unfavorable group, none showed roentgenographic improvement, 8 were clinically improved, 8 unchanged and 20 worse, 14 dying in the hospital. The usual dosage was 1 cc. intramuscularly twice a week for usually 30 doses. Of the 20 who got worse, 18 had less than 30 doses. Of 40 in the groups with fair or bad prognosis, 7 had diarrhoea, 5 albuminuria. No definite toxic symptoms attributable to the cadmium were noted. —*Cadmium. The Immediate Results of Its Use in the Treatment of Pulmonary Tuberculosis, V. C. Cornwall, Tubercle, September, 1938, xix, 542.*—(*A. P.*)

Tuberculin Patch Therapy.—The advantages of intracutaneous tuberculin therapy are two-fold. In the first place tuberculin is filtered through the cutaneous tissue in such a way that an absorption of too high amounts is prevented. In the second place the tuberculin is slowly absorbed. Moreover, the intracutaneous method allows a certain dosage. However, the method is rather time-consuming, costly and technically difficult. Simplification and improvement of this therapeutic method has been attempted by adopting its advantages and eliminating its disadvantages. Thin filter paper is saturated with half-strength or full-strength of Old Tuberculin from synthetic medium. The filter paper is dried and cut into squares of one sq. cm. Such a square centimetre of filter paper saturated with half-strength tuberculin is taken as a unit for the quantitative dosage. As a measure of precaution the skin sensitivity of the individual is determined before the therapy is started. This is carried out by an allergometric tuberculin sensitivity test with gradually increasing tuberculin concentrations. This sensitivity test is applied upon the skin for forty-eight hours and read like the tuberculin patch test. Regular sets of gradually increasing doses have been devised and the therapeutic patches are applied at intervals of one week to the skin, which has been cleansed and defatted with acetone, ether or benzine. Each patch is placed upon a different area of skin, not covered with hair, for two days and then removed. Too strong local reactions should be avoided and acute inflammatory reaction to each test should have completely subsided before the next patch is applied. This therapeutic method is indicated for tuberculous disease of the eye, skin, bone and joint, lymph nodes, lungs (indurative form), kidneys and hilar lymph nodes. Essentially the treatment is a desensitization therapy. This method has been used in 25 tuberculous children in Sea View Hospital. In all instances the treatment has been absolutely harmless. In none of about 250 instances when a tuberculin patch was applied was any febrile reaction observed. About 50 per cent of the children showed roentgenographic evidence of improvement in addition to the general improvement.—*Tuberculin Patch Therapy, H. Vollmer & Esther W. Goldberger, Quart. Bull. Sea View Hosp., April, 1939, iv, 317.*—(*A. A. E.*)

Rubrophen Treatment in Surgical Tuberculosis.—This new drug seemed worth thorough study since several hospitals in Budapest reported striking results. A number of selected patients have been treated since the fall of 1937 with this medicine only. Rubrophen owes its name to its dark reddish hue. It is the active principle of a guaiacol and iodoform mixture. The isolated substance, chemically characterized as "trimethoxydioxyoxotritan," is a crystalline body hardly soluble in alcohol and water. Its sodium bisulphite compound, however, is readily dissolved in water. The advantage of this new preparation is the avoidance of unpleasant effects in parenteral administration. It has proved to be but slightly toxic in animals as well as in man. The drug is eliminated through the kidneys, the urine being colored red. Occasionally gastrointestinal difficulties have been observed which respond readily to pepsin with hydrochloric acid. It may be administered in the form of tablets, in the form of ampoules and in the form of a lanolin ointment. It is emphasized that the oral administration equals the value of parenteral treatment. Rubrophen is said to be of therapeutic value only in cases of extrapulmonary tuberculosis, including tuberculous skin and eye diseases. In animal experiments it has so far been inefficient. The first effect of the treatment may show up after a few days or weeks in form of a definite focal reaction with pains and fever. This is to be considered as a favorable sign. Improvement of the general condition and decrease of the sedimentation rate should occur after a short time. Sometimes an increase of eosinophiles may indicate a successful treatment. A summary of the results known so far in the literature demonstrates remarkable success even in desolate cases. Their own results did not equal those reports. Out of 41 cases (tuberculous

lymphoma, nonoperable urogenital tuberculosis and bone and joint tuberculosis) 13 healed, 15 improved and 13 showed no change or got worse. Cervical tuberculous lymphoma apparently reacted best. In conclusion, rubrophen as an addition to other conservative or active treatments seems advisable.—*Die Behandlung der chirurgischen Tuberkulose mit Rubrophen, H. Schaer, Schweiz. med. Wchnschr., April 22, 1939, xvi, 369.*—(*A. B. T.*)

Bronchoscopic Dilatation.—Benedict here records 3 cases of bronchial stenosis manifest after thoracoplasty for pulmonary tuberculosis, none having had previous observations. He holds to the view that the collapse procedure aggravated a preëxisting tracheobronchial tuberculosis. All three cases were females and had rather long-standing histories of pulmonary tuberculosis. All had had phrenicectomies in addition to thoracoplasty. All subsequently had attacks of cough, fever and intermittent sputum, foul in one case, and were more or less incapacitated. Bronchography with lipiodol was performed in two cases in addition to bronchoscopy and both methods of examination showed localized bronchial stenosis. The Henning right angle vision oesophagoscope was introduced through the bronchoscope in order to visualize upper lobe bronchi. Two cases were permanently relieved of symptoms and the third markedly benefited by repetition of the bronchoscopy with the use of oesophageal dilators. It should not be inferred from these good results that the treatment of tracheobronchial tuberculosis is easy, yet complete remission from wheezing, rhonchi and other obstructive symptoms may be obtained. The dilatation should be repeated in order to maintain an adequate lumen. In one case, two treatments were apparently sufficient. In no case was the tuberculosis reactivated. —*Bronchoscopic Dilatation of Bronchial Stenosis following Thoracoplasty for Tuberculosis, E. B. Benedict, New England J. Med., April 13, 1939, ccxx, 617.*—(*A. P.*)

Results of Collapse Therapy.—On the basis of positive or negative sputum, the therapeutic results of collapse therapy, exclusive of thoracoplasty, in 297 patients in Jena from 1925 to 1935 are reported. The cases were observed from two to twelve years and the results were compared with those obtained in a group of 76 patients who during 1925 to 1935 had no collapse therapy, either because it was refused or was technically impossible. The results in both groups of patients are reported on the basis of follow-up in 1937. Of the patients who received unilateral pneumothorax, with or without pneumonolysis or phrenic operation, 48.5 per cent were negative; with bilateral pneumothorax, 21 per cent; with phrenic exairesis alone, 12.5 per cent. The results seem to show that the favorable effects of pneumothorax are dependent to a great extent upon the long duration of it, even if the patient is ambulant during the latter portion of the therapy. While the best results in pneumothorax were found in patients between the ages of twenty and twenty-five, up to the age of forty-five the results are not much less favorable. Of the untreated patients 21 per cent were negative. By comparing this result with that obtained in the unilateral pneumothorax cases, the author estimates that if 100 patients with pulmonary tuberculosis heal spontaneously, 230 will be cured by collapse therapy.—*Dauerfolge der Kollapsbehandlung der Lungentuberkulose, G. Bucholdt, Ztschr. f. Tuberk., May, 1939, lxxxii, 224.*—(*A. B. C.*)

Tension Pneumothorax. — Tension pneumothorax is established by the existence of a bronchopleural communication which acts as a one-way valve, permitting the entrance of air into the pleural cavity during inspiration and preventing its escape during expiration. As the resulting dyspnoea increases, the inspiratory efforts become more vigorous, more air is pumped into the pleural cavity and the condition is aggravated. In most cases the aetiology of this condition is underlying active pulmonary disease; in the "idiopathic" cases the aetiology is obscure. Cure depends upon the healing of the valve-like tear in the lung. As the intrapleural pressure rises, a point is reached at which the tear in the lung is kept closed during both phases of respiration. In the majority of cases healing will then occur if the patient is kept at rest. In a smaller number the opening persists for months and even years. Various substances have been employed to produce an inflammatory pleuritis with resultant sealing of the chronic pleuropulmonary communication. The authors used iodized poppyseed oil and a saturated solution (67 per cent) of dextrose. Twenty-five to 60 cc. of the dextrose solution were used at one time and 10 to 12 cc. of the oil were employed. Using these substances, a clinical cure was obtained in 5 of 6 cases of chronic bronchopleural fistula with tension pneumothorax. The sixth case left the hospital before the treatment could be completed. The iodized oil produced a more acute reaction, a greater pleural effusion and more constitutional symptoms.

These symptoms soon subside and the use of both these substances appears to be safe. Failure to become absorbed is an objectionable feature of the oil. More than one treatment was sometimes required. In one case when the dextrose solution failed to produce closure, the later use of iodized oil was effective. It is essential that the induction of a chemical pleuritis be supplemented by prolonged rest in bed, with the patient lying on the affected side and by adequate use of sedatives. Attempts should be made to prevent increased respiratory effort.—*Tense Pneumothorax, H. Hennell & M. F. Steinberg, Arch. Int. Med., April, 1939, lxiii, 648.*—(*H. R. N.*)

Pneumothorax for Giant Cavities.—Pneumothorax was induced in 87 patients with upper or midlung field cavities, 5 cm. or more in diameter. Favorable results, cavity closure and negative sputum, were obtained in 55 patients, or 63 per cent of the series. Pneumothorax was therapeutically successful in all patients with neither fluid nor adhesions; in 75 per cent, with both fluid and adhesions; in 70 per cent, with fluid and no adhesions; and in 42 per cent, with adhesions and no fluid. From the results of this series, the development of fluid during pneumothorax is not considered an unfavorable complication. In concurrence with other observers, the beneficial effects are attributed to the additional compression which fluid presents mechanically and to the immunobiological property of the fluid, its antibodies promoting healing of the underlying lung. The compression obtained from fluid is enhanced by adhesions, particularly mediastinal and medial apical adhesions, which in 12 patients, when associated with fluid, produced 100 per cent favorable results. Pneumothorax is recommended for hilar giant cavities treated successfully in this series, and known to respond poorly to other forms of collapse therapy.—*Der Erfolg der Pneumothoraxbehandlung bei Riesenkavernen, Cellarius & Lemberger, Ztschr. f. Tuberk., February, 1939, lxxxi, 382.*—(*A. B. C.*)

Termination of Pneumothorax Treatment.—Our knowledge of when to terminate artificial pneumothorax is still far from complete and the present views are the culmination of ten years' experience at the Brompton Hospital and the King Edward VII Sanatorium, Midhurst, England. Most important is the type of disease originally present and any general statement which will hold for all cases is apt to be misleading. The original type of lesion may be (*1*) a small area of infiltration in one lung, perhaps the size of a shilling, the lesion being entirely symptomless and discovered by X-ray examination. There is no fever and almost normal blood sedimentation rate. Todd believes these may well be allowed to obliterate within two years and that many would have become well without active intervention. (*2*) Cases of fibrocaseous disease perhaps involving half a lung with little or no definite cavitation and little evidence of toxaemia, with usually slight amount of positive sputum. The average duration of pneumothorax treatment in this type of case should be at least three years. (*3*) Cases of acute bronchopneumonic disease with symptoms of acute general toxaemia, high temperature, markedly increased blood sedimentation and general prostration. These patients will naturally need a longer period of treatment which should be at least four years. (*4*) Cases with thin-walled cavities and some surrounding infiltration with some or all the symptoms associated with active pulmonary tuberculosis. These should have a longer period of collapse than the preceding. (*5*) Cases of thick-walled cavities of fairly longstanding which should generally have pneumothorax continued indefinitely. The estimation of duration of collapse should be from the time of obtaining complete and adequate collapse and not from the initial institution of pneumothorax. Should cavities at any time reopen, the necessary period of treatment will have to be correspondingly altered. Also cases complicated by adhesions will require more prolonged treatment. Tentative partial reexpansion is condemned if done for the purpose of ascertaining the degree of healing, as a reopening of lesions may cause the waste of valuable time. Even small departures from normal health should be considered as possible warnings unless otherwise satisfactorily explained. Complications in reëxpansion: (*1*) Excessive formation of tough fibrous tissue encapsulating the pulmonary lesions. This may be ruptured in reëxpansion if carried out too rapidly, following which the lesions progress; or it may prevent real expansion. (*2*) Pleural exudate, through thickening of the visceral pleura, may greatly hinder lung reëxpansion, either of the whole lung or particular lobes. (*3*) The lower lobe may reëxpand completely while the fibrotic upper fails to do so and necessitates later an apical thoracoplasty to fill the residual pocket. In lungs collapsed over considerable periods readjustments are necessary and time for these should be permitted. During the reëxpansion it may become necessary, either owing to reactivation of disease or reopening of cavities, to reinduce the pneumothorax. Therefore the lung

should not be too soon allowed to approximate the thoracic wall. As all lobes do not reëxpand at the same rate or time it is foolish to prematurely permit partial obliteration of a pneumothorax. Quite often a sterile exudate forms. This should be removed and replaced with air to avoid irregular obliteration due to adhesions. As the lung reëxpands the lung fields should be carefully scrutinized for any appearance suggesting reactivation or cavity reopening. The temperature should be taken regularly and tolerance to activity estimated. If the intrapleural pressure becomes too negative a supplementary phrenic evulsion should be done. The process of reëxpansion altogether will consume three to six months. After reëxpansion is complete excercise should not be increased for some months until several X-ray films have demonstrated complete healing. In a few cases contraselective collapse will necessitate termination; on the other hand, it is not necessarily advisable to abandon pneumothorax before doing an extrapleural pneumothorax in communication with a partial intrapleural one. This is easily kept up. It can also be combined with upper thoracoplasty without further detriment than a traumatic pleural exudate, which is best replaced by air. In allowing these cases to reëxpand the same principles hold. Abandonment may necessitate an unnecessary amount of rib resection and added risks. Abandonment of the original pneumothorax at once is seldom advisable on account of contralateral spread of disease. Sanocrysin seems to benefit some cases. In cases with spread a longer period of treatment than average is generally advisable. Pleural exudate is no reason to abandon pneumothorax. After the temperature reaction has subsided air replacement is best, while small exudates are merely carefully followed by fluoroscopy. Those that become thick and purulent need lavage with saline or eusol solution. Some patients, it is true, will need thoracoplasty. Even so, the lavage is valuable as a preliminary measure. If there is a secondary infection, air-tight underwater drainage is the procedure of choice, after which most of them require rib resection but rarely until after quite an interval. To close the residual sinus thoracoplasty is necessary.—*The Termination of Artificial Pneumothorax, G. Todd, Brit. J. Tuberc., April, 1938, xxxii, 76.*—(*A. P.*)

Selective Collapse.—Bronchial occlusion is followed by atelectasis in the area of lung supplied by the bronchus involved. Persistent bronchial occlusion, by neoplasm or foreign body, for example, is usually followed by inflammatory and later suppurative changes within the atelectatic segment of lung. Atelectasis in otherwise uncomplicated cases of pulmonary tuberculosis is occasionally observed following, for example, haemoptysis, and the relatively benign course the disease thereafter tends to take has been commented upon. The author felt that healing of the disease might be aided if atelectasis could be induced in the area of lung involved by tuberculosis, provided the suppurative changes attendant upon permanent occlusion could be avoided. This would really amount to controlled selective collapse. A thin double catheter was devised, fashioned of material opaque to roentgen rays, which resembled a double ureteral catheter. Towards the distal end of this instrument, one catheter ended in an inflatable watertight rubber collar, while the other catheter projected beyond the collar and remained open. The diameter was such that it could be passed through a small bronchoscope. Evipan and local anaesthesia have been found very satisfactory for introducing the bronchoscope and catheters. Once the catheter is introduced into the desired bronchus, the rubber collar is inflated with a 30 per cent solution of sodium iodide, the volume of solution required having been previously determined with the instrument inserted into a glass tube of diameter similar to that of the bronchus to be obstructed. Slight traction on the instrument suffices to show whether the cuff is firmly in position. The catheter leading to the cuff is then clipped off, and the other catheter is attached to a suction apparatus. Air is then removed until a sufficiently negative pressure (−30 mm. of mercury) is attained and maintained. The pressure tubing is then clipped and the bronchoscope removed. The progress of the selective collapse can then be followed radiologically and when atelectasis is attained the collar is deflated and the instrument removed. About six hours occlusion was found to be necessary for atelectasis. In 10 cases, in association with artificial pneumothorax, this method of bronchial occlusion was tried. Selective collapse was achieved in 6, with the immediate closure of preëxisting cavitation in 3. In the remaining 4 cases the failure to produce atelectasis could be attributed to a defect in the instrument, a bronchopleural fistula, or adhesion of the lobe which it was desired to collapse to the chest wall. In the 6 cases in which selective atelectasis was attained, follow-up studies showed that atelectasis has persisted in 5 for periods varying between six months and one year. In the successful cases the cavities either disappeared or diminished in size; in no case

did a cavity increase in size. In one case, possibly because the catheter slipped while the bronchoscope was being removed, atelectasis of an entire lung was produced; reëxpansion of the undiseased portion took place within twenty-four hours while the diseased area remained selectively collapsed. This case suggests that, should it be impossible, for technical reasons, to obstruct the ultimate bronchus supplying the diseased area in any case, bronchial occlusion at an accessible proximal site may be considered, in the expectation that selective reëxpansion will subsequently take place. Six of the cases were examples of basal disease, mainly because it was easier to introduce the instrument into the lower lobes. It would appear that this method would be of value in association with thoracoplasty, if employed at the time of, or very soon after, operation. The method also deserves trial in association with extrapleural pneumothorax. In no case was the procedure followed by any serious consequences to the patients.—*Induced Selective Collapse in Pneumothorax Therapy, W. D. W. Brooks, Brompton Hospital Reports, Vol. 7, 1938.*—(*H. R. N.*)

Accidental Extrapleural Pneumothorax.—Among over 400 pneumothorax cases at the Olive View Sanatorium, 15 instances of accidental extrapleural pneumothorax were observed in a year. Thoracoscopic observation, made in the first case, clarified the roentgenological evidence in this and subsequent cases. The area varies in extent but occurs at the site of air injections. The displaced parietal pleura is represented by a very fine, sharply defined, white line which starts and ends at the chest wall. Where the parietal pleura leaves the chest wall the line has a crinkled, lacy, loculated appearance, while the completely displaced parietal pleura gives a fairly smooth line. This line is separated from the visceral pleura line by a clear area which does not contain any lung markings, and the two lines may even cross each other. Adhesions between the parietal and visceral pleurae always have lung markings mesially. At the site of intrapleural adhesion, the parietal pleura is usually firmly attached to the endothoracic fascia limiting the extrapleural pneumothorax and frequently causing an increase in its size proximately. The X-ray evidence disappears in two or three months if no further injections are made into the pocket. This complication occurs only in patients in whom the pneumothorax is fairly recent, or in whom the pleura has not been thickened by inflammatory change. It is not serious but may lead to untimely abandonment of the intrapleural pneumothorax because the patient usually complains of a "tight" feeling and a small amount of air gives positive manometric readings which previously had been negative with average amounts.—*Accidental Extrapleural Pneumothorax, Roentgenographic Appearance, W. R. Oechsli, Am. J. Roentgenol., October, 1938, xl, 545.*—(*E. M. J.*)

Air Embolism in Artificial Pneumothorax.—The two most dangerous complications to be avoided in artificial pneumothorax are air embolism and spontaneous pneumothorax. Air embolism is fortunately a rare accident, although Forlanini reported 12 such accidents in 10,000 interventions (about one per cent) and other authors of experience cite about the same figures. Deviations are accounted for by failure to recognize symptoms of minor degree which are difficult to distinguish from the vasomotor disturbances of susceptible patients, for example, faintness or nausea induced by mere insertion of needle. The symptoms of air embolism may be quite transient and fleeting. Schlaepfer has shown that in the pathologically altered lung air embolism is more likely to occur than in normal lung because in the presence of induration and adhesions in the former, vascular contractility is impaired. In the prevention of air emboli manometric control is of first importance. Heretofore in most types of apparatus, it has been necessary to cut off the manometer during the passage of air. However, it has been noted that, provided the horizontal outflow tube is of uniform bore, the levels of liquid in various vertical branches or cut-offs will follow an inclined curve between the level of the liquid in the vessel and the outflow orifice. When the latter is closed it will rise in all the branches according to the "law of communicating vessels." A sudden rise should always suggest closure of the outlet orifice. Pleural pressure fluctuations are also manifested in the manometer readings. Design of suggested apparatus: There are first two superimposed glass vessels, the upper a graduated cylinder, the lower a flask. Each connects by a tube to a multi-way cock, connected in turn to two manometers. These are connected in parallel to (*1*) needle tube (*2*) filling tube and (*3*) pumping device. A rubber ball pump forces air into the flask, displacing the water or solution. During induction of pneumothorax the flow is reversed and air passes from the lower vessel into the pleural cavity. In this emptied portion of the cylinder a partial vacuum is produced. The multi-way cock admits of four settings, corresponding to (*1*) filling the

apparatus with air; (*2*) causing the air to pass into the pleural cavity; (*3*) measuring this intrapleural pressure; and (*4*) withdrawing air from the pleura. It is operable with one hand and in the dark, the front disk being comparable to the dial of a clock in various positions at regular intervals. In addition to the advantage of having only a single stopcock, the manometer is constantly in communication with the needle tube, thus detecting changes in position or obstruction. It is even possible to set an upper limit at which a bell will ring. No special clamp is needed for refills. Each filling is by aspiration without excess pressure. Only one limb of the manometer is visible, the one which is read.— *Air Embolism Complicating Artificial Pneumothorax* (*Describing a New Automatic Pneumothorax Apparatus*), *W. Koch, Brit. J. Tuberc., April, 1938, xxxii, 96.*—(*A. P.*)

Postural Therapy in Ineffective Pneumothorax.—This postural method is applied by having the patient lie on the affected side, at first only removing the pillow, then gradually raising the foot of the bed 10 to 20 cm. It is well tolerated, though giving at times slight headaches and transitory retrosternal fulness, especially following refills. The beneficial effects of this "declivotherapy" are thought to be due to very limited costal excursion of the recumbent side, to higher respiratory efficiency of the contralateral hemithorax, while, inversely, the diaphragm of the recumbent side has a higher excursion (6 to 7 cm.) than that of the contralateral side. This latter action of the diaphragm approaches the same condition as that following phrenic nerve surgery, and is mainly due to the weight of the abdominal organs against the diaphragm. This postural treatment has been used with satisfaction in cases of ineffective pneumothorax, when additional surgical procedures, such as phrenic nerve surgery or intrapleural pneumonolysis, were unsatisfactory or not accepted by the patient. This innocuous procedure, simple in its application and, above all, of rapid and frequent effectiveness, as seen in clinical cases already reported, makes this new addition to treatment worthy of preference over other curative procedures, at least at first. One may resort to other well known collapse measures when declivotherapy has proved unsuccessful.—*Contributo clinico sulla declivoterapia nei pneumotoraci insufficienti, V. Panto, Lotta contro la tuberc., August, 1938, ix, 771.*—(*S. L.*)

Pneumothorax in Tuberculosis of Infancy and Adolescence.—After an extensive review of the literature one reaches the conclusion that the reinfection type of tuberculosis in the young is essentially the same as in the adult. Therapeutic pneumothorax is, therefore, indicated and efficient in early life, be the disease unilateral or bilateral. Since 1930 unilateral pneumothorax has been given to 110 out of 455 children treated in the Municipal Sanatorium of Milano; 95 children were thought to have a precise indication because their disease was mostly unilateral; in the remaining 15 the disease was bilateral, quite advanced in one lung, and hopes of success were thought to be slight. Six children were between four and seven years of age, 104 from seven to fifteen years. Most cases had pneumonic, bronchopneumonic or caseous and cavernous lesions. Twenty-two cases of primary infection were included, because their lesions did not show any tendency to regression, gave clinical signs of activity or had roentgenological evidence of a spread. Technique of induction and refills does not vary from that used for adults. Local anaesthesia is not thought advisable, although even general anaesthesia may be resorted to when inducing pneumothorax in some very young and nervous patients. Highly positive intrapleural pressures are harmful, especially when adhesions are present. Hypotensive pneumothorax is preferred, thus avoiding dangers of mediastinal hernia. For children, refills should be smaller and more frequent than for the adult because of quick resorption of air and easier loss of pleural space. Intervals between refills may be longer when there are contralateral lesions, but even then refills should be small and with low intrapleural pressures until optimum has been obtained. An interval of fifteen days and refills of 250 cc. for younger children and 400 cc. for adolescents are thought to be the maximum limit, never to be exceeded under any circumstances. It is preferable to complete the treatment while these young patients are in the sanatorium, but during the last months of treatment it may be given to some adolescents only, as out-patients, when they have shown sufficient improvement and have developed a sense of responsibility while in the sanatorium during the first stages of therapy. Pneumothorax should be continued long after all clinical symptoms have disappeared. Reëxpansion should be considered only when there is persistent clinical and roentgenological evidence of healing. Reëxpansion should be slow and cautious, and the physician must be always ready to reëstablish collapse if lesions reappear while the lung is coming out. Usually collapse should be maintained one to

one and a half years in favorable cases with uncertain or no evidence of excavation at induction of pneumothorax, and two to four years in more advanced cases. It is unwise to keep a child's lung collapsed too long, because then complete reëxpansion is apt to be difficult. In a child, more frequently than in an adult, pneumothorax may obliterate because of sudden pleural symphysis. It may have to be discontinued sooner because of ineffective collapse or because of severe tuberculous complications, especially intestinal. With strict and careful technique accidents are rare in the course of a pneumothorax in children. Subcutaneous emphysema in this series occurred in 3 or 4 cases, at the site of the puncture. A child's lung may be easily punctured by the needle because of thinness of the thoracic walls and also because of the nervousness and instability of these young patients; traumatic pneumothorax by accidental puncture of the lung occurred in 2 cases, one of them followed by pleural effusion. Gas embolism is a more serious accident in a child than in an adult, but is not frequently seen. Twenty-eight children had flare-ups or spread of preëxisting lesions in the contralateral lung; 14 of them ended in death. Twenty-seven children developed serous effusions; 3 children had empyemata and ended in death. Mediastinal hernia was observed in few cases. In addition to the above number, 24 children, all between the ages of ten and fourteen, were given bilateral pneumothorax. Indications for this type of treatment are the same as for the adult; but indispensable conditions are good cardiovascular function and sufficient vital capacity. Contralateral pneumothorax should be induced early and with greater care. Children should remain in the sanatorium until the end of the treatment. Pleural effusion occurred in 6 cases, 2 of which died; empyema in one case with fatal result. Accidents were less frequent. Results of treatment with unilateral pneumothorax were: cured or improved 55 per cent, unchanged or worse 20 per cent, died 25 per cent. With bilateral pneumothorax: improved 33 per cent, worse or unchanged 29 per cent, died 38 per cent. These results are thought satisfactory. Where indications for this treatment were precise, 66.6 per cent of the children treated were either cured or improved at the time this report was made, one to over six years after pneumothorax had been discontinued.—*Il pneumotorace terapeutico nella tubercolosi dell'infanzia e dell'adolescenza, C. Zoboli, Arch. di med. e chir., February, 1939, viii, 3–221.*—(*S. L.*)

Insatiable Pneumothorax.—In some cases it is difficult to maintain a lung collapsed by artificial pneumothorax, no matter how frequent or large the refills. This phenomenon has been attributed to the fact that in such cases the pulmonary lesions are restricted to a small area, that the structure of the parenchyma and of the pleurae is not much altered, and that pulmonary elasticity and permeability of the serosa are preserved. This, however, does not occur in all similar cases. It has been thought, therefore, that an individual factor in relation to pulmonary elasticity and muscular tone contributed to increased speed of absorption of intrapleural gas. For this study experimental pneumothorax was given to dogs, after first establishing whether the animals were vagotonic or hypovagotonic. Speed of absorption of intrapleural gas was decidedly higher in vagotonic dogs. Intramuscular injections of atropine retarded the absorption of the same amounts of intrapleural gas as previously given to vagotonic dogs; while intravenous injections of eserine hastened this absorption in hypovagotonic dogs. Atropine acts by paralyzing the vagus, thus decreasing pulmonary expansion; it also acts as a vasodilator and its action is antagonistic to that of eserine. These experimental researches permit the conclusion that, in all probability, insatiable pneumothorax is due to an abnormal expansibility of the lung, under an increased vagal tone influence, together with a maintained, if not increased, ability of the pleurae to absorb the gas.—*Sulla genesi del pneumotorace insaziabile, G. Baldacci, Riv. di pat. e clin. d. tuberc., January, 1939, xiii, 1.*—(*S. L.*)

Pneumothorax and Work Therapy.—Indications for work therapy in tuberculosis and the response of the various forms of the disease to this therapy are of increasing importance to-day, when the problem of social reëducation of the patient is of general interest to both the physician and the sociologist. The clinical criteria for the choice of patients to be given rationally dosed work are still uncertain. Therapeutic physical activity is only one of the many forms of stimulating therapy that give beneficial results when initiated during stable stages or spontaneous regression of the disease. Since early 1936 a number of patients with certain clinical forms of tuberculosis have been admitted to the "Special Working Department" of the Sanatorio Bernardino Ramazzini in Rome. According to the former trade, aptitude and physical possibility, patients are given work as gardeners, carpenters, mechanics, blacksmiths, etc. Work is meticulously dosed by the physician. Twenty-three patients with therapeutic pneumothorax have been studied after admission to this department. Of this

number, 20 have had very good results from the work therapy, while continuing with their refills, 3 of them bilaterally. In 15 cases the interval between refills became longer after starting to work. Only 3 patients of the original 23 had to stop work after a few days because their pulmonary disease proved to be unstable, their pneumothorax having been induced on an average of five months previously. In conclusion, when collapse has been carried on already for sufficient time (an average of 470 days in the 20 successful cases), it appears that work therapy can be used with good results. Bilateral pneumothorax, contralateral proliferative lesions, afebrile pleural effusions, previous additional collapse procedures, such as pneumonolysis and phrenic nerve paralysis, are not contraindications to work therapy in pneumothorax patients. No local or general complications of importance were noted in any of the patients, when indications were exact. The best results were had in patients with early diagnosis and hospitalization.—*Osservazioni sull'andamento del pneumotorace terapeutico in alcuni tubercolotici sottoposti alla terapia del lavoro, F. Damiani, Lotta contro la tuberc., December, 1938, ix, 1144.*—(*S. L.*)

Bilateralization of Tuberculosis in Artificial Pneumothorax.—In order to prevent contralateral spread during the course of collapse therapy it is important to select the patients carefully, to establish correctly the type and activity of the pulmonary lesion, the degree of pressure and the amount of refills of the pneumothorax, and to outline the regimen to which the patient should be subjected during the treatment. Special attention should be given to the occurrence of anergic stages, to intercurrent diseases, to the state of nourishment, to the power of resistance, to the mental and physical behavior, and to general hygienic circumstances of the home environment. The author has observed 10 cases of bilateralization of various types, most of which presented hilar and juxtahilar dissemination. Other cases showed contralateral intercleido-hilar infiltration, upper lobar involvement and juxtafissural lesions. Pleurisy of the opposite side is rare just as extrathoracic spread such as laryngitis and meningitis. Although several cases developed intestinal tuberculosis during the course of pneumothorax the percentage seemed not to be higher than without collapse therapy. Contralateral spread occurred especially in cases with recent lesions of the progressive type and in tuberculous pneumonias and bronchopneumonias.—*Ensayo de clasificacion radiografica de las bilateralizaciones en el neumotorax terapeutico y causas que las favorecen, O. C. Macias, Rev. de tuberc. d. Cuba, October, 1938, xi, 406.*—(*F. G. K.*)

Oleothorax.—This paper reports the postmortem studies in 2 cases of pulmonary tuberculosis in which death occurred two and a half and three years after extrafascial apicolysis which was followed by the induction of oleothorax. Two hundred and fifty and 310 cc. of a warm paraffin preparation were introduced respectively. In neither instance did the procedure itself lead to any complication. The patients died, one from generalized pulmonary tuberculosis, the other from a tuberculous meningitis secondary to a tuberculous otitis. At autopsy the paraffin masses which had been originally sausage shaped were found to be spherical. Neither had lost more than 3 cc. in volume. Sectioning revealed a hard white paraffin mass with a smooth capsule 3 mm. thick. There was a very sharp line of demarcation between the capsule and the paraffin. In one case there was a septum 1 to 1.5 mm. in thickness traversing the mass. Histological studies were essentially the same in both instances. The capsule was made up chiefly of layers of sclerotic hyaline connective tissue with poorly staining nuclei. The outer layer of the capsule was rich in capillaries and small blood vessels. About the capillaries were fine brown pigment granules which gave a Turnbull-blue reaction. The innermost layer lying next to the paraffin mass was sharply defined from the latter and revealed no evidence of organization. Sudan stain showed an irregular thick layer of homogeneous lamellae which took up the stain incompletely in small irregular masses and in fine granules. With haematoxylin-eosin stain these lamellae stained two shades of rose and contained a few scattered leucocytes with ragged nuclei. Van Gieson stains likewise failed to reveal any true structure here. This layer consisted apparently of masses of fibrin and swollen connective tissue fibres. There was no doubly refractile material present. The septum was composed of similar material with real structure. A section from the region where the capsule merged with the posterior thoracic wall showed in general a similar picture, with again the sharp line of demarcation between the capsule and the paraffin mass. In one place, however, in the outermost layer of the capsule delicate fibrous strands had formed a honeycombing network enclosing little spaces of varying size and containing refractile and doubly refractile material. This material did not stain with Sudan stain. In this region there were round cells clustered about the capillaries while nearby

were clumps of leucocytes. Young connective tissue cells, histiocytes, and foreign body giant cells predominated. In general, however, the outermost layer was a spongy cellular connective tissue rich in capillaries and containing foci of fat cells with an occasional focus of round cells. There were no changes attributable to tuberculosis. There was no evidence of any tendency to organization of the paraffin mass itself. Studies made of the specimen from the other case showed much the same thing. There was only one tiny paraffinoma which had developed not in the large mass of paraffin but in a little pocket in the tissues where it had been introduced at operation.—*Über die Einheilung von extrapleuralen Paraffinplomben bei Lungenkavernen, A. Herlemann, Virchows Arch., June, 1939, cccciii, 745.—(C. L. D.)*

Oleothorax and Empyema.—Oleothorax has been employed for various purposes. The oleothorax of compression designed to complete the collapse in cases of inefficient pneumothorax has been abandoned for the most part, mainly because of the dangerous sequelae and the advent of the Jacobaeus procedure. Oleothorax, used as an aid in cleaning up pleural infections, is still widely employed but has been also partly replaced by other methods such as pleural lavage. Oleothorax is also employed to prevent the progress of pleural obliteration in pneumothorax; here it has frequently proved very useful, but has not been entirely without danger as illustrated by a case observed by the authors. This patient had an effective left pneumothorax in spite of the presence of an apical adhesion for which intrapleural pneumonolysis was not deemed necessary. Eight months after induction, oleothorax was carefully established because pleural obliteration at the base was noted; sterile mineral oil with one per cent gomenol was used. Six days after the last injection of oil, the temperature rose to 105°F. and the patient appeared extremely ill. The fever fell rapidly but increased pleural fluid was shortly noted. This fluid, at first turbid, rapidly became purulent. Frequent examinations revealed no bacteria. Moreover, at no time was any oil seen in the aspirated fluid. After frequent aspirations together with pleural lavage with saline, the empyema subsided and the lung expanded. It is interesting that toward the end of treatment the pleural fluid became serous. Apparently, in this case, the oil acted as a foreign body which was engulfed by white blood cells and thus eliminated from the body. When the oil was completely absorbed, there was no further need for the polymorphonuclear leucocytes and the fluid became clear. Such cases, where no organisms are found, usually have a good prognosis.—*Pleuresie puriforme aseptique au cours d'un oléothorax antisymphysaire, J. Stephani, E. Arnold & E. Cottin, Progrès méd., no. 19, May 13, 1939, 663.—(H. R. N.)*

Pleural Lavage with Oxygen.—It is frequently desirable to effect rapid reëxpansion of a lung which has been partially collapsed by pneumothorax. This reëxpansion, when possible, may take weeks or even many months. Usually this is not a disadvantage but rapid reëxpansion may be desirable. It is the volume of gas in the pleural space which keeps the lung collapsed. This gas tends to have a uniform composition in any individual case reaching an equilibrium shortly after a refill with air. The major part of pleural gas is nitrogen (88 to 92 per cent), a very slowly diffusing and slowly absorbed gas. Because of the slowness with which nitrogen is absorbed, it was felt that replacement of it by some more rapidly absorbable gas would allow more rapid reëxpansion of the lung. Oxygen, a natural respiratory gas, is rapidly and readily absorbed from the pleural cavity. In using oxygen, the patient is first fluoroscoped to determine the extent of the pneumothorax space. Any fluid is aspirated and the patient is then placed in the lateral recumbent position with the pneumothorax uppermost. One needle is introduced into the upper pole of the pneumothorax space and connected with the manometer of the deflation apparatus. A second needle, the oxygen inlet, is placed in the lower portion of the space. Midway between this needle and the tank supplying pure oxygen is a deflation bottle half filled with water and closed with a two-hole rubber stopper. Through one opening in this stopper passes a glass tube which extends below the level of the fluid; its outer end is connected to the oxygen tank. A shorter glass tube which ends above the fluid level in the bottle is connected by a rubber tube to the needle in the chest wall. Oxygen is then introduced into the pleural cavity while gas is being aspirated through the upper needle. This procedure is continued for about twenty-five minutes at which time there is 90 to 95 per cent saturation with oxygen. Occasional manometric readings are taken in order to maintain the pressure at a mean of zero. At the end of the specified time the oxygen needle is removed and when final pressures of about − 8 and 0 have been obtained, the other needle is removed. The patient is then fluoroscoped daily to determine the

extent of reëxpansion. The procedure may subsequently be repeated. The indications for pleural lavage with oxygen are: (*1*) for the expansion of a lung ineffectually collapsed by pneumothorax when other collapse therapy is to be used; (*2*) the necessity for promptly increasing vital capacity; and (*3*) for the expansion of a lung collapsed by tuberculous empyema. The histories of 10 patients so treated are given. The basis for the procedure is the difference in diffusion rates of the constituent gases of the pleural space. The usual pleural gas findings are: carbon dioxide 6–12 volumes per cent, oxygen 0–3.5 volumes per cent, and nitrogen 88–92 volumes per cent. It has been shown that oxygen is absorbed much more rapidly than air or nitrogen and has a more rapid diffusion rate. The partial pressure of nitrogen in the blood is, in most circumstances, about 600 mm. of mercury; and in a pneumothorax space nitrogen usually has a partial pressure of about 650 mm. of mercury. This small difference allows for only slow diffusion. Since oxygen may enter the blood-stream in solution and in combination with haemoglobin, the laws of partial pressure do not obtain and more oxygen will be absorbed at a given partial pressure of the gas, than if mere solution took place. Thus when nitrogen is replaced by oxygen in the pleural space, there is rapid absorption with the creation of a highly negative pressure and quick physiological expansion of the lung. Within about four days after oxygen lavage analysis of the pleural gas shows a return to the status before lavage.—*Rapid Reëxpansion of Lungs —Pleural Lavage with Oxygen, A. Welkind & M. Herman, Quart. Bull. Sea View Hosp., January, 1939, iv, 153.*—(*A. A. E.*)

Pneumoperitoneum.—The authors review the development of pneumoperitoneum and describe its therapeutic application in tuberculous enteritis and pulmonary tuberculosis. Particular attention is called to the value of pneumoperitoneum in the control of pulmonary haemorrhage and in the relief of gastrointestinal symptoms secondary to phrenic paralysis and thoracoplasty.—*Le pneumopéritoine dans ses récentes applications thérapeutiques, B. Besta & J. Dutrenit, Rev. de la tuberc., June, 1938, iv, 670.*—(*H. L. I.*)

Mediastinal Emphysema following Pneumoperitoneum.—Various sites have been recommended for the injection of air into the peritoneal cavity. Among these is the subphrenic route in which the point of entrance of the needle is above the costal margin but below the costophrenic reflection of the pleura. In a group of 110 patients receiving artificial pneumoperitoneum for treatment of pulmonary tuberculosis, the subphrenic route was used in 42. Of these, mediastinal emphysema complicated the treatment in 7. Time of onset of symptoms varied from a few minutes to five hours. The most prominent symptoms were pain in and about the larynx, choking sensation and hoarseness. In addition some patients complained of soreness or stiffness of the neck, difficulty in coughing, dyspnoea due to soreness, pain on swallowing, shoulder pain and moderate to severe retrosternal nonradiating pain. Symptoms abated from the twelfth hour to the third day and complete relief was observed from twenty-four hours to four days. Treatment consisted of bed-rest and sedatives. This complication was not seen in patients receiving air by the subumbilical route but was relatively frequent among those receiving air by the subphrenic route. Air may have escaped from the peritoneal cavity and reached the mediastinum by spreading along the great blood vessels that pass through the diaphragm or along the oesophagus. It also may have found its way through the peripheral portion of the diaphragm, which might have been injured by the injecting needle, elevating the basal parietal pleura, and dissecting its way along the upper surface of the diaphragm.—*Mediastinal Emphysema as a Complication of Artificial Pneumoperitoneum, A. L. Banyai & G. H. Jurgens, J. Thoracic Surg., February, 1939, viii, 329.*—(*L. F. B.*)

Surgery in Pulmonary Tuberculosis.—Collapse therapy can be regarded from the point of view of arrest of disease in the patient and the prevention of spread of the disease to other people. Although death rates from pulmonary tuberculosis have been falling since 1851, it is the general impression that the actual case mortality has not appreciably improved. Study of the figures given by various authors shows that expectation of surviving for five years is increased from 20 per cent without collapse measures to 60 per cent with collapse measures. In general, the place of surgery in cases with cavitation is early in the disease. One of the striking results of efficient collapse of cavities is the early disappearance of tubercle bacilli from the sputum even in many patients who subsequently die of the disease. From the point of view of preventive medicine, surgical collapse treatment is of great value. To obtain good results it is essential that treatment be administered by people who have sufficient cases to become and remain expert. For more severe pro-

cedures a properly equipped operating theatre is necessary. Regional centres are advocated, where patients may be sent for major surgical operations.—*The Place of Surgery in the Treatment of Pulmonary Tuberculosis, J. E. H. Roberts, J. Roy. Inst. Pub. Health & Hyg., November, 1938, i, 857.*—(*L. F. B.*)

Collapse Therapy.—The authors present the result of a study of 7,341 patients observed at the Chicago Municipal Tuberculosis Sanitarium over a period of six and one-half years. Of this total, 3,090 had collapse therapy for a period of more than three months, and 3,584 were controls. Ninety-four per cent of the patients had advanced tuberculosis, 84 per cent had positive sputum and 81 per cent had pulmonary cavitation. Of the series, 439 were Negroes. End results revealed that 69.3 per cent of the patients treated more than three months were living, while of those receiving no collapse therapy, or treated for less than three months, only 33.6 per cent were living, which indicates a survival ratio of 2 to 1 in favor of those receiving collapse therapy. Actual corrected figures for sputum conversion show an apparent ratio of 51 per cent for treated patients as against 13.8 per cent for the controls. A comparison of the end results with the stage of disease shows that of the moderately advanced cases 83.3 per cent of treated cases are living as against 57.7 per cent of the controls, while in the far advanced group the corresponding percentages are 70.5 against 21.5. Again, in the far advanced group, 60.4 per cent of the treated patients fell in the better end result classification, as against 14 per cent of the controls. Considering the factor of elapsed time in comparing end results, 64.3 per cent of treated patients are alive after six years as compared with 31.3 per cent of the no-collapse group, while of those admitted the year previous to the final observation period, the corresponding percentages are 89.0 and 49.6. One of the principal objects of the investigation was to compare the end results of large scale field collapse with the results of sanatorium treatment. A survival rate is indicated of 66.5 per cent for patients treated exclusively in the clinic, 75.9 per cent for patients treated exclusively in the Sanitarium and 84.9 per cent for those who had the advantages of combined clinic and Sanitarium treatment. The figures for the Sanitarium and clinic combined are the best, indicating a coordination of the field and institutional functions as the ideal basis for a plan of collapse. The question of the initial pneumothorax treatment outside the institution did not seem to make a great difference; 70.6 per cent of the patients who received the initial treatment in the clinic were living, as against 78.1 per cent of the patients who received their first injection in the Sanitarium. Classified according to types of treatment, the results were better for combined collapse (two or more procedures) than for any individual measure. Collapse is viewed as a treatment sequence with an ideal indication and an optimum moment for each operation. In considering the results of treatment for the Negro, collapse therapy reduced the expected mortality ratio of 6 to 1 as compared with the whites, to an actual ratio of 3 to 2.—*Collapse Therapy at Chicago Municipal Tuberculosis Sanitarium, A Critical Study of 8083 Cases, F. Tice & A. J. Hruby, J. A. M. A., July 8, 1939, cxiii, 101.*—(*G. L. L.*)

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